

14 July 1958

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MEMORANDUM FOR:

Col. Harry Blich

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Col. Andrew Cox

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SUBJECT : Exchange of Information on Geneva Technical
Discussions

1. Attached for your information is a summary prepared
by the JAEIC Secretariat of [REDACTED]'s impression to date 25X1X4
on the Geneva Technical Conference through 13 July 1958.

2. Any Department or Agency representative having additional
Geneva information that could be distributed throughout the
intelligence community are requested to pass same to the JAEIC
Secretariat for incorporation in future summaries.

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JAEIC Secretariat

Enclosure:

As stated.

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14 July 1958

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SUMMARY OF [REDACTED] IMPRESSION TO DATE
ON THE GENEVA TECHNICAL CONFERENCE
THROUGH 11 JULY 1958

The entire first two days were occupied with political harangues by the Soviet delegation designed to make the US delegation appear to be obstructionists. Fedorov's initial speech in closed session was a masterful piece of work designed to establish an apparent air of Soviet cooperation, demonstrate the feasibility of detecting tests, and finally to put the U.S. in the position of being non-cooperative in not wanting to discuss cessation of tests. This gave Western delegates the impression the Soviets were preparing an advantageous position for release or publication in event they chose to break off the talks.

On the second day, the U.S. was successful in getting into the record some of the major difficulties in detecting tests and a legitimate view of the objectives of the discussions.

In Fedorov's opening address in closed session the first day, he jumped into the high altitude problem very rapidly; and, in contrast to the underground detonation situation, seemed confident of achieving detection. The following are a few quotations on the subject:

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"In explosions in the air, including explosions at great altitudes, there occurs also a characteristic radiation effect, which is the so-called electromagnetic method. We call it the radiation impulse in our scientific language. This can also be picked up over a very large distance.

"Finally, if the explosion takes place high up in the atmosphere, or beyond the atmosphere, we know that in the case of the existing vacuum one can successfully use a form of detection on the basis of gamma radiation over a great range. In many cases, for the registration of explosions, we can use the effect on light rays. However, we believe this method is a somewhat limited one if we take into account the question of atmospheric conditions. Under any conditions, as a result of explosions, there is a radioactive release which is carried over large distances even in the case of minor explosions and can be considered, for instance, with the amount of natural radioactive products which exist in the solar system."

While the confidence expressed here may be due to more extensive scientific data from upper atmosphere research and Sputniks, Dr. Bethe, 25X1X4Mr. Northrup, and [REDACTED] developed independently the feeling that there was a distinct possibility that the Soviets had actually conducted a very high altitude test. This tentative conclusion is quite preliminary, however. The U.S. delegation is attempting to pursue this line of discussion further. In this connection, the U.S. delegation has requested State Department to obtain declassification

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of some of the U.S. material on very high altitude effects that was withheld in the first go-around of the Conference Security Classification Guide (paras. 6e 3, 4, 5, & 6 and Bethe paper).

In aside conversations, 2 July, Simane and Semenov both admitted the Soviets presently lack a solution to the problem of detection of underground nuclear tests.

After the first two days' discussions, the Soviets started at the next meeting (on the fourth day) to subordinate propaganda to technology. Brekhovskikh gave a good but fairly general and straightforward paper on transmission of waves, primarily concerning acoustic but with reference to electromagnetic through natural wave guides. Gubkin later got into some more practical aspects of discussion in this field and it can be assumed that he is actively involved in at least the acoustic part of the Soviet detection program. It is possible he is the "Gubin" who attended the Toronto meeting of the IUGG in September 1957.

There has been considerable emphasis in several presentations on the requirement for developing a firm control system. This came to a head in some of the discussions over the agenda when the Soviets insisted on including in the agenda as a major item a system for controlling the carrying out of an agreement on a nuclear test cessation:

- a. Determination of observational program to be utilized at control stations.
- b. Determination of the number of control stations.

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c. System of processing observational data, reports and information provided by control stations.

On previous occasions there were references to false alarms and statements that we should not be worried about this type of situation. Simane (Czech) stated:

"It would be equally useful, as pointed out by the delegate of the Soviet Union, to consider also the case of the suspicion of nuclear explosion, both in order to ensure complete safety, and it would be necessary to effect, for instance, thorough soundings of the area of original explosion."

25X1X4 [REDACTED] believes that, if the discussions continue, the Soviets will desire to go into the whole control system in detail and reach firm conclusions which should be of interest to the U.S. intelligence community.

The following points of possible intelligence interest were noted in the Soviet papers on acoustic detection:

a. Soviet belief that acoustic signal from a 10 KT shot detonated at 10 kilometers altitude would not be different from same test at surface, and that such a signal would be detectable from five to six thousand kilometers.

b. Discussion of the firing of several kilograms of TNT in a high altitude rocket at 100 kilometers altitude and the detection of such a shot on the ground.

c. A statement that theoretical studies indicate that at higher altitudes a large portion of energy will be absorbed in the ozone layer creating an acoustic wave.

In connection with the discussions of acoustic systems, the Soviets seemed to put greater emphasis on theory and to claim that experiments confirmed this theory. They also claimed higher accuracy and reproducibility than U.S. experience indicates. Balashov proposed an acoustic system using microbarographs under lakes for the purpose of reducing background noise. He stated that ten stations detected the March 1956 Kamtchatka volcano. The Soviets believed that an acoustic signal from a detonation of 10 KT at 10 kilometers altitude would not be essentially different from the same test at the surface but they presented no data for a surface shot under the same conditions.

The Soviets proposed the use of downwind acoustic ranges only. They reported 90 observations available but presented no details. All of these Soviet discussions were based on a one KT detonation. Leipunski questioned the U.S. proposal to limit the acoustic detection system to explosions of 50 kilometers altitude. Pasechnik presented a description of relatively primitive microbarograph equipment. He also indicated that Soviet acoustic stations are placed at the same locations as seismic stations. He referred to stations in the Lake Baikal area and to stations 50 kilometers from the 30 March 1956 Kamtchatka volcano.

In general, the Soviets supplied some useful acoustic data but the U.S. delegates gained the impression that the Soviet system is poorer than that of the U.S.

Before the 8 July meeting, Rocard was told by Hulubei that all Soviet papers presented to date were prepared in advance of the 25X1X4 Conference. [REDACTED] believes that Brown's effective presentation of statistical data for acoustic detection ranges which justified a relatively close spacing of stations placed the Soviets on the defensive for the first time and may force a more practical approach by the Soviets.

In the meeting of 9 July the Soviets agreed almost completely with U.S. proposals summarizing acoustic capabilities. Although no complete systems were discussed, the agreement is expected to involve many acoustic stations inside the USSR.

Following the acoustic discussions, the Conference came to the following conclusions:

"1. When there are explosions in air, a strong air acoustic wave is formed which propagates over large distances. An indication of the amplitude of the air pressure wave is given by a formula which is approximately valid for a homogeneous atmosphere and according to which this amplitude is proportional to the cube root of the yield and inversely proportional to the distance. However, the amplitude of this acoustic wave is strongly dependent upon meteorological conditions and cannot be predicted accurately by a simple formula of such a kind. The observed amplitude can be as much as five times larger or smaller than that predicted by a formulation which includes only the energy release and the distance to detecting stations.

"2. Existing apparatus of special design can detect the air wave from a one kiloton explosion in the air above local background noise at relatively large distances. The detection capability of a single station is strongly dependent upon the orientation of the propagation path to the station with respect to the upper winds. When the upper winds are mainly in one direction, a one kiloton explosion can be detected with a high degree of confidence downwind at a distance of 2,000 to 3,000 kilometers and upwind at a distance of 500 kilometers. When the upper winds are erratic and the average wind is small, such as frequently happens in the spring and fall, detection of a one kiloton explosion can be accomplished with a similar degree of confidence to a distance of approximately 1,300 kilometers independently of the direction. On the basis of the records from three stations, the location of the explosion can be determined with an accuracy of better than 100 kilometers.

"3. Acoustic stations at the above distances from an explosion can detect explosions which occur between the surface and a height of 30 kilometers. A reasonable extrapolation of existing experience indicates that for explosions taking place up to an altitude of about 50 kilometers there should not be a great change in the detectability of the acoustic wave. Whether a substantial acoustical wave will be generated at higher altitudes is not well known from direct experiment or from any theoretical

considerations so far discussed. Subsurface or underwater explosions which are deep enough to be essentially contained do not produce significant air waves useful for detection purposes. An underwater explosion in the oceans generates very strong underwater sound waves (hydroacoustic), which even in the case of small explosions can be detected at distances of about 10,000 kilometers.

"4. Acoustic waves, which resemble in certain cases the acoustic signals of nuclear explosions, may be produced by natural events (primarily meteoric volcanic or submarine disturbances). In such cases, identification of the event as natural or as a nuclear explosion must be based on a comparison of acoustical data with those obtained by aid of other methods.

"5. The conference of experts recommends the inclusion of methods for the registration of acoustic (air and hydroacoustic) waves in the list of basic methods for the detection of nuclear explosions with the aid of a network of control posts. The conference notes that methods of registration of pressure waves may be further improved to increase the precision and the sensitivity and to eliminate background noise and spurious signals."

The Conference continued with a discussion of radioactive methods of detection. Fedorov presented a long paper justifying the use of ground stations in place of collection by aircraft. Both sides tabled draft conclusions on radioactive measurements, but the debate on need for aircraft sampling is expected to continue.

In response to a question, Fedorov stated that the Soviets obtained a fallout from a ten KT detonation at 10 kilometers altitude. We have been unable to date to identify the shot referred to. He questioned the validity of U.S. results demonstrating small vertical and horizontal cloud diffusion.

Fedorov proposed a delay in decision on radioactivity until Tuesday, 15 July, presumably for instructions. Also, Soviets attempted to alter agenda to delay seismic discussion since apparently no practical Soviet seismologists present in Geneva.

Soviets have repeatedly referred to the need for inspection teams to visit suspected locations.

The apparent U.S. sincere desire to discuss problems on a sound and constructive scientific basis and their willingness to supply supporting data has apparently made a strong favorable impression on the scientific members of the Soviet delegation.